

**REMARKS**

These amendments and remarks are filed in response to the final Office Action dated July 2, 2010. In view of these amendments and remarks, this application should be allowed and the case passed to issue. No new matter is introduced by these amendments. Support for the amendment to claims 6 and 8 is found in Table 1, Examples 3 and 4. The claimed ratio is a result of dividing the arithmetic average roughness Ra of the rolling element by the arithmetic average roughness Ra of the pocket guide face.

Claims 2-10 are pending in this application. Claims 2-10 are rejected. Claims 6 and 8 are amended in this response. Claim 1 was previously canceled.

***Claim Rejections Under 35 U.S.C. § 112***

Claims 2-5 and 8-10 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement because there is allegedly no disclosure of the significance of the average roughness of 0.08 micrometers. This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The rolling element surface roughness of 0.08  $\mu\text{m}$  is found in Table 1, Example 3. The Examiner provided no legal basis for finding that the presence of a data point in a table is insufficient to establish compliance with the written description requirement in the Advisory Action of November 12, 2010. The Examiner's finding that the disclosure in the present specification is insufficient is therefore arbitrary and is in error. The claims were rejected as failing to comply with the written description requirement. Applicants have shown where there is a written description of the claimed subject matter. The Examiner has no basis for finding the written description to be insufficient.

In order to achieve long life, it is necessary to prevent the rollers from being worn by an attack from the cage. For the prevention, a good lubrication state needs to be maintained. However, in a roller design based on general lubrication theory (thermal elastohydrodynamic lubrication theory) to have a small surface roughness, such wear is hardly prevented. Unlike the general theory, the present invention has a feature that the surface roughness of each roller is designed to fall within the optimum range found from experimentation (from the lower limit of  $R_a = 0.08 \mu\text{m}$  to the upper limit of  $R_a = 0.15 \mu\text{m}$ ), thereby improving the effect of smoothing a lubricant and the adherence effect resulting from an increased surface area as described in the present specification (page 3, lines 21-27). This increases the oil-forming property. The oil-forming property is determined by the degree of irregularity of the surface. Since life data associated with the upper limit and the lower limit of the surface roughness is provided in the disclosed embodiment, it is clear that the life within a range between the upper limit and lower limit is disclosed.

The relation ( $R_a$  : life ratio) between surface roughnesses  $R_a$  of the rollers and the life ratios are indicated in Table 1 of the present specification as follows: 0.02:1, 0.04:8, 0.08:13, 0.15:>19, and 0.20:4, assuming surface roughness  $R_a = 0.02$  as a reference value. The relation between surface roughness  $R_a$  of each roller and each life ratio is indicated in the attached Reference Figure. Referring to the attached Reference Figure, the life ratio is increased as surface roughness  $R_a$  of the roller is increased in a range of  $R_a$  of 0.02 to 0.15. As shown in the Reference Figure, long life is obtained when the surface roughness  $R_a$  of the roller falls within the range of 0.08 to 0.15.

***Claim Rejections Under 35 U.S.C. § 103***

Claims 2-5 and 8 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Jahn (US 3,240,542) in view of Ikezawa et al. (US 5,630,668). The Examiner found that Jahn discloses a thrust needle bearing employing lubricating oil and having a rolling element (3) held by a cage (4) and rolling on a race, the cage has a cage pocket (2), in which the rolling element is stored to come in contact with a pocket guide face (6, 61, 7). The Examiner acknowledged that Jahn does not disclose a specific clearance dimension, but discloses a clearance be set so as to facilitate the entry of wedge-shaped layers of lubricant. The Examiner found the clearance dimension is a result dependant variable. The Examiner concluded that it would have been obvious through routine experimentation to select a clearance range of 60-130  $\mu\text{m}$  to allow for lubricating wedge of lubricant. The Examiner acknowledged that Jahn does not disclose a value of the arithmetic average roughness Ra of the rolling element. Ikezawa et al. teach a thrust needle bearing employing lubricating oil having a rolling element held by a cage wherein the arithmetic average roughness Ra of the rolling element set to at least 0.3 micrometers and at most 0.15 micrometers. The Examiner concluded that it would have been obvious to set the average roughness Ra below 0.05 for the purpose of decreasing friction and reducing wear.

Claims 6, 7, 9, and 10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Jahn. The Examiner concluded that it would have been obvious to select a clearance within the claimed range for the desired purpose of allowing a lubricating wedge of oil to achieve the desired lubricating characteristics.

These rejections are traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the invention, as claimed, and the cited prior art.

Jahn and Ikezawa et al., whether taken in combination, or taken alone, do not suggest the claimed thrust needle bearings. The cited references do not suggest the clearance between the pocket guide face of the cage and the rolling element is set to at least 60  $\mu\text{m}$  and at most 130  $\mu\text{m}$ , and a ratio of the value of the arithmetic average roughness Ra of the rolling element to the value of the arithmetic average roughness Ra of the pocket guide face is set to 0.2 to 0.375, as required by claim 6; and the clearance between the pocket guide face of the cage and the rolling element is set to at least 60  $\mu\text{m}$  and at most 130  $\mu\text{m}$ , and the value of the arithmetic average roughness Ra of the rolling element coming into contact with the shear plane is set to at least 0.08  $\mu\text{m}$  and at most 0.15  $\mu\text{m}$ , and a ratio of the value of the arithmetic average roughness Ra of the rolling element to the value of the arithmetic average roughness Ra of the pocket guide face is set to 0.2 to 0.375, as required by claim 8.

**The Unexpected Results are Counterintuitive**

Jahn and Ikezawa et al. do not suggest the unexpected improvement in depth of wear of roller, 10 % life, and life ratio, as shown in Tables 3 and 4 of the specification. In fact, the results achieved by the present invention are counterintuitive. The present invention is superior to thrust needle bearings having **smoother** surfaces. Further, as regards claim 8, synergy is achieved by the combination of the claimed rolling element smoothness and clearance between a pocket guide face of the cage, as explained in the specification in the paragraph bridging pages 8 and 9. In addition to not disclosing that the rolling element comes into contact with the pocket guide face constituted by the shear plane formed through pressing, Ikezawa et al. also do not teach that the surface roughness Ra of the rolling element coming into contact with the shear plane, is set to at least 0.08  $\mu\text{m}$  and at most 0.15  $\mu\text{m}$ , as required by claim 8. As a result of the ratio of the value of the arithmetic average roughness Ra of the rolling element to the value of

the arithmetic average roughness Ra of the pocket guide face being set to 0.2 to 0.375, the surface roughness of the rolling element approaches the surface roughness of the pocket guide face that is a shear plane. As a result, wear of the rolling element caused by contact with the pocket guide face can be reduced. As shown in Table 1 of the present specification, excellent results are obtained in terms of depth of wear of roller, 10% life, and exfoliated part in samples 3 and 4 where Ra is 0.08  $\mu\text{m}$  or more, and a ratio of the value of the arithmetic average roughness Ra of the rolling element to the value of the arithmetic average roughness Ra of the pocket guide face is set to 0.2 to 0.375, as compared with sample 2 having a Ra 0.04  $\mu\text{m}$ . Ikezawa et al., on the other hand, discloses, "the surface roughness is desirably adjusted to be no more than 0.05  $\mu\text{m}$ " (col. 11, lines 48-50, see also claim 7).

Furthermore, Table 2 of Ikezawa et al. illustrates that excellent properties are not obtained in any of service life, pitting, flaking, peeling, and wear in samples of more than 0.05  $\mu\text{m}$  Ra. Therefore, Ikezawa et al. neither disclose nor suggest excellent properties obtained in depth of wear, 10% life, and exfoliation by setting the Ra to at least 0.08  $\mu\text{m}$ . Rather, Ikezawa et al., clearly teach away from setting the Ra to at least 0.08  $\mu\text{m}$ , as required by claim 8.

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). There is no suggestion in Jahn et al. and Ikezawa et al. to modify a thrust needle bearing to provide a cage having a cage pocket, in which the rolling element is stored to come in contact with a pocket guide face thereof constituted by a

shear plane formed through pressing for the cage pocket, and the clearance between the pocket guide face of said cage and the rolling element is set to at least 60  $\mu\text{m}$  and at most 130  $\mu\text{m}$ , a ratio of the value of the arithmetic average roughness Ra of the rolling element to the value of the arithmetic average roughness Ra of the pocket guide face is set to 0.2 to 0.375, as required by claim 6; and a cage having a cage pocket, in which the rolling element is stored to come in contact with a pocket guide face thereof constituted by a shear plane formed through pressing for the cage pocket, the clearance between the pocket guide face of the cage and the rolling element is set to at least 60  $\mu\text{m}$  and at most 130  $\mu\text{m}$ , and the value of the arithmetic average roughness Ra of the rolling element coming into contact with the shear plane is set to at least 0.03  $\mu\text{m}$  and at most 0.15  $\mu\text{m}$ , a ratio of the value of the arithmetic average roughness Ra of the rolling element to the value of the arithmetic average roughness Ra of the pocket guide face is set to 0.2 to 0.375, as required by claim 8.

The only teaching of the claimed thrust needle bearings is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must not be based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). The Examiner's unsupported, conclusory assertions are not sufficient to establish a prima facie case of obviousness.

*Response to Arguments*

**The Examiner has no basis for concluding that Applicants' evidence of unexpected results is routine experimentation**

In response to Applicants' assertions of unexpected results, the Examiner did not find the results to be unexpected. The Examiner's finding is **strenuously** traversed. The Examiner has no basis for concluding that the tables show evidence of routine experimentation. The cited references (Jahn and Ikezawa et al.) do not suggest the unexpected improvement in depth of wear of roller, 10 % life, and life ratio, as shown in Tables 1, 3, and 4 of the specification. In fact, the results achieved by the present invention are counterintuitive, as explained above. The present invention is superior to thrust needle bearings having smoother surfaces. Further, as regards claim 8, the cited references do not suggest the synergy achieved by the combination of the claimed rolling element smoothness and clearance between a pocket guide face of the cage, as explained in the specification in the paragraph bridging pages 8 and 9. As noted in *In re Geisler*, 116 F.3d 1465, 1471 (Fed. Cir. 1997) (citing *In re Soni*, 54 F.3d 746, 751, 34 USPQ2d 1684, 1688 (Fed. Cir. 1995), "[W]hen an applicant demonstrates *substantially* improved results, . . . and *states* that the results were *unexpected*, this should suffice to establish unexpected results *in the absence* of evidence to the contrary." *Geisler*, 116 F.3d at 1471 (quoting *In re Soni*, 54 F.3d 746, 751, 34 USPQ2d 1684, 1688 (Fed. Cir. 1995)) (emphasis in original). In the present application Applicants have presented evidence of unexpected results and explained the legal basis for the assertion of unexpected results, while the Examiner has merely presented unsupported arguments. Because the Applicants have presented evidence and the legal basis for the unexpected results, while the Examiner has not presented any **evidence** or **legal basis** to counter the unexpected results, it is clear that unexpected results have been established.

In the Response to Arguments section, the Examiner further determined the evidence in the specification was not compared with the closest prior art. The Examiner has no basis for concluding that the tables in the specification do not compare the closest prior art. The Examiner has not identified the purported "closest prior art." Further, Applicants may compare the claimed invention with prior art that is more closely related to the invention than the prior art relied upon by the examiner. *In re Holladay*, 584 F.2d 384, 199 USPQ 516 (CCPA 1978). Because the Examiner did not identify the closest prior art, it appears that the Examiner may be suggesting that the combination of Jahn and Ikezawa et al. is the closest prior art. Requiring Applicants to provide a comparison to a combination of references is improper. Although evidence of unexpected results must compare the claimed invention with the closest prior art, applicant is not required to compare the claimed invention with subject matter that does not exist in the prior art. *In re Geiger*, 815 F.2d 686, 689, 2 USPQ2d 1276, 1279 (Fed. Cir. 1987) (Newman, J., concurring); *In re Chapman*, 357 F.2d 418, 148 USPQ 711 (CCPA 1966) (Requiring applicant to compare claimed invention with polymer suggested by the combination of references relied upon in the rejection of the claimed invention under **35 U.S.C. 103** "would be requiring comparison of the results of the invention with the results of the invention." 357 F.2d at 422, 148 USPQ at 714) (See MPEP § 716.02(e)(III)).

The Examiner's arguments in the Advisory Action amplify the Examiner's erroneous findings. Applicants have presented evidence of unexpected results, while the Examiner relies on conclusory statements lacking evidence. In fact, the Examiner acknowledged that Applicants "rely on the tables in the specification." In other words, Applicants rely on evidence submitted in the specification under a declaration. Whereas, the Examiner merely relies on unsupported, conclusory arguments. Further, the evidence of unexpected results is counterintuitive. As

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explained above, the present invention is superior to thrust needle bearings having smoother surfaces. One of ordinary skill in this art would have expected that the smoother the surface, the better the properties of the bearing. The Examiner has not presented any evidence that the tables show routine experimentation, and it appears the Examiner has ignored Applicants' sound legal basis for asserting unexpected results.

In view of the above remarks, Applicants submit that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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Reference FigureLife Ratio (1 when  $Ra = 0.02$ )